

a timing recovery unit coupled to receive the receive serial data stream from the interface unit, wherein the timing recovery unit is configured to produce a clock signal derived from the receive serial data stream and to provide the receive serial data stream; and

a serial communication controller coupled to receive the clock signal and the receive serial data stream, wherein the serial communication controller comprises a plurality of functional units configured to operate in series according to a serial communication protocol, and wherein each functional unit is configured to perform a different specific function of said serial communication protocol, and wherein the plurality of functional units operates alternately upon the portions of the multiple serial data channels of the receive serial data stream to perform said serial communication protocol on the multiple serial data channels.

REMARKS

Claims 1, 6, 11 and 14 have been amended. Claims 1-16 are pending. Reconsideration is respectfully requested.

Section 103 Rejection:

Claims 1-11 and 14-16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,970,069 to Kumar et al. (hereinafter “Kumar”) in view of U.S. Patent No. 5,991,817 to Rowett (hereinafter “Rowett”). Applicants traverse this rejection in light of the following remarks.

The cited art does not teach that each functional unit is configured to perform a different specific function of the same serial communication protocol on

the multiple serial data channels, as recited in claim 1. Kumar describes a remote access processor 34 that supports multiple communication protocols. As illustrated in Fig. 3 of Kumar, function units 80 implement a serial protocol, functional units 76a-d each implement various SWAN protocols, functional unit 74 implements an Ethernet protocol, and functional unit 72 implements the V.34 protocol. In contrast, Applicants' claim 1 recites that each of the plurality of functional units performs a different specific function of the same protocol. Thus, by each performing a different function of the same protocol, the functional units of claim 1 operate together to perform one protocol on multiple data channels of the serial data stream. Kumar does not teach multiple functional units that are each configured to perform a different specific function of the same serial communication protocol on multiple serial data channels of a serial data stream. The functional units of Kumar do not work together to perform different specific functions of one protocol on multiple channels. Instead, each functional unit in Kumar separately performs a specific protocol on a separate channel. Nor does Rowett or any combination of Kumar and Rowett teach that each functional unit is configured to perform a different specific function of the same serial communication protocol on the multiple serial data channels. The Examiner relies on Rowett to teach operating in time sequence upon portions of multiple serial data channels. However, even if Kumar was modified to operate in time sequence upon portions of multiple serial data channels, each functional unit would still operate separately to perform a particular protocol on a particular channel. The combination of Kumar and Rowett does not teach or suggest that each functional unit is configured to perform a different specific function of the same serial communication protocol on the multiple serial data channels, as recited in claim 1.

Moreover, Applicants' claim 1 recites that the same functional units that perform different functions of the same protocol operate on multiple different channels of a serial data stream. Thus, claim 1 recites that the same functional units are used to perform the same protocol on multiple different channels of the serial data stream. In contrast, both Kumar and Rowett describe using different functional units for each channel to perform a protocol. As illustrated in Fig. 3 of Kumar, each functional unit (80, 76a-d, 74, 72) operates on a different channel. Similarly, Rowett describes a

separate set of functional units for each channel, as shown in Fig. 11a of Rowett. Thus, Kumar and Rowett do not teach or suggest that the same functional units that perform different functions of the same protocol operate on multiple different channels of a serial data stream.

Similar arguments apply to independent claim 14.

In regard to claim 6, the cited art does not teach or suggest a plurality of functional units that operate alternately upon the portions of the multiple serial data channels, wherein different state information is transferred for each serial data channel depending on which serial data channel's portion is being operated on by the plurality of functional units. Claim 6 recites that different state information is transferred between the functional units and the memory unit depending on which serial data channel's portion is being operated on by the plurality of functional units. Neither Kumar nor Rowett describe transferring different state information to their functional units depending on which serial data channel's portion is being operated on by the functional units.

A similar argument applies to independent claim 11.

Telephone Interview:

In a telephone interview on April 11, 2003 between Examiner Nguyen and Applicants' undersigned attorney, Examiner Nguyen agreed that that this amendment would overcome the current rejection.

CONCLUSION

This response constitutes a complete response to all issues raised in the final Office Action mailed October 25, 2002. Applicants assert that pending claims 1-16 are in condition for allowance.

The Commissioner is authorized to charge any fees which may be required, or credit any overpayment, to Meyertons, Hood, Kivlin, Kowert & Goetzel, P.C. Deposit Account No. 50-1505/5000-74400/RCK.

A marked-up copy of the amended claims follows.

Respectfully submitted,



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MARKED-UP COPY OF AMENDED CLAIMS

1. (Amended) A serial communication controller for transmitting and receiving a serial data stream including multiple serial data channels having portions which alternate in time with respect to each other, comprising:

a plurality of functional units [operably coupled] configured to operate in series according to a serial communication protocol, wherein each functional unit is configured to perform a different specific function of [a] said serial communication protocol, and wherein the plurality of functional units operates in time sequence upon the portions of the multiple serial data channels; and

wherein the plurality of functional units is configured to perform said serial communication protocol on the multiple serial data channels.

6. (Amended) A serial communication controller for transmitting and receiving a serial data stream including alternating portions of multiple serial data channels, comprising:

a plurality of functional units each configured to perform a specific function of a serial communication protocol, wherein each functional unit is a state machine having a set of unique operating states, and wherein each functional unit comprises a programmable state register, and wherein state information stored within the state register of a given functional unit determines the one of the unique operating states in which the functional unit is operating;

a memory unit including a separate portion allocated to each of the multiple serial data channels for storing the state information of the functional units; and

a microcontroller coupled to each of the plurality of functional units and to the memory unit, wherein the microcontroller is configured to transfer state information between the plurality of functional units and the memory unit such that the plurality of functional units operates alternately upon the portions of the multiple serial data channels;

wherein different state information is transferred for each serial data channel depending on which serial data channel's portion is being operated on by the plurality of functional units.

11. (Twice Amended) A method for transmitting and receiving a serial data stream including alternating portions of multiple serial data channels, comprising:

providing a plurality of functional units each configured to perform a specific function of a serial communication protocol upon the portions of the multiple serial data channels, wherein each functional unit is a state machine having a set of unique operating states, and wherein state information stored within a given functional unit determines the one of the unique operating states in which the functional unit is operating; and

transferring state information between the plurality of functional units and a memory unit such that the plurality of functional units operates alternately upon the portions of the multiple serial data channels;

wherein different state information is transferred for each serial data channel depending on which serial data channel's portion is being operated on by the plurality of functional units.

14. (Amended) A serial communication system, comprising:

an interface unit adapted for coupling to a transmission medium, wherein the

interface unit is configured to receive a receive serial data stream including alternating portions of multiple serial data channels from the transmission medium and to provide the receive serial data stream;

a timing recovery unit coupled to receive the receive serial data stream from the interface unit, wherein the timing recovery unit is configured to produce a clock signal derived from the receive serial data stream and to provide the receive serial data stream; and

a serial communication controller coupled to receive the clock signal and the receive serial data stream, wherein the serial communication controller comprises a plurality of functional units [operably coupled] configured to operate in series according to a serial communication protocol, and wherein each functional unit is configured to perform a different specific function of [a] said serial communication protocol, and wherein the plurality of functional units operates alternately upon the portions of the multiple serial data channels of the receive serial data stream to perform said serial communication protocol on the multiple serial data channels.